

REMARKS

The Examiner objected to an informality related to the use of the variable Φ in the specification. The applicant has modified Equation 13 as recommended by the Examiner. Accordingly, Paragraph 51 has been amended to correct the error.

The Examiner also objected to the drawings for informalities in Fig. 8, box 600. A corrected drawing sheet is attached. The applicant and the undersigned attorney thank the Examiner for catching these errors.

The Examiner rejected Claims 1-4, 7-14 and 17-21 under 35 U.S.C. 102(a) as anticipated by Feinleb et al. (U.S. Patent No. 4,399,356), and rejected Claims 22 and 24 as anticipated by Millerd et al. (U.S. Patent No. 6,304,330). The Feinleb patent describes a device for correcting distortions present in a single incoming image. It uses a prism to divide the incoming light beam into multiple channels (n, four are used for illustration) directed to respective separate detector arrays. The image detected at each channel is used to determine the distortions in the incoming light beam by comparing the relative intensity signals at the same pixel location of each channel detector. A correction is then applied to the incoming wavefront assuming that each detector array is conjugate to the input pupil and that

the measurement apparatus has no residual optical distortions (other than the centering of the detector arrays). The wavefront in each of the four channels is detected "as is" and is used directly to determine the incoming beam's geometric distortions based on tip measurements acquired by corresponding detectors in each of the arrays used to capture the four divided images.

The patent refers to each element in each detector array as corresponding to a "subaperture" of the incoming beam (S such detector elements and subapertures; see col. 2, lines 6-19, and lines 26-28, in particular). Accordingly, it describes corresponding detector elements in each array providing a measurement of tilt of a subaperture's wavefront (col. 2, lines 31-34), which is then used to determine a correction factor for that subaperture of the incoming beam. The matrix of correction factors resulting from the process enables correction for the beam seen at the input pupil of the device. No correction is, or could be, provided for distortions introduced by the device itself into each of the four channel beams.

In contrast to the teachings of Feinleb et al., the present invention teaches a correction matrix used to correct geometric distortions introduced by the multi-channel imaging system itself. The single input beam is split into multiple channels, as in the Feinleb device, but the method of the invention is then directed at measuring the distortion introduced by the splitting

device, not the incoming beam. To that end, the image in each channel is further divided into multiple sub-images detected on a detector array for that channel. A correction matrix is determined and used to correct each sub-image measured by the multi-channel imaging system, not the incoming image, which is assumed acceptable.

Accordingly, Claim 1 is directed to a method of correcting images obtained from a multi-channel imaging system, as opposed to an image received by a multi-channel imaging system (Feinleb). As such, the claim recites the step of "producing a sub-image in each channel of the system..." Feinleb only detects conjugate subapertures of the incoming image by measuring them directly in corresponding detector elements of each channel's array without further dividing each channel to produce sub-images; that is, it does not positively "produce" sub-images in each channel. The claim further recites "measuring a geometric distortion introduced by the system in each sub-image." Even accepting broadly that these sub-images read on Feinleb's subapertures, the reference teaches measuring a geometric distortion in the incoming beam using such sub-images, which is the opposite of what is being claimed by the applicant. Finally, Claim 1 recites the step of "applying said geometric correction matrix to remove geometric distortion from measurement sub-images produced by the system." In contrast, Feinleb teaches applying a correction matrix to correct distortions in the incoming wavefront to the system.

Therefore, the Feinleb reference is not believed to teach the sequence of steps recited in Claim 1. Feinleb uses a multi-channel device to find a correction matrix to correct distortions in the incoming beam, while the applicant uses the beams produced by a multi-channel imaging system to find correction matrices to correct the images produced in each channel of the system. While both inventions deal with a multi-channel apparatus, the objectives of the two inventions are distinct and, accordingly, the approach followed by each is different. These distinctions are reflected in the pending claims. Therefore, this reference is not believed to anticipate the invention of Claim 1.

Apparatus Claim 12 recites structural limitation similarly absent in the Feinleb device. Most notably, Feinleb discloses means for producing sub-images of the incoming single channel, while the claim recites "means for producing a sub-image in each channel ..." of the multi-channel system. The claim also recites "means for applying said geometric correction matrix to remove geometric distortion from measurement sub-images produced by the system," which is absent in the Feinleb device, as addressed above. There is no teaching in Feinleb that would indicate how the device could be used to produce correction factors to remove distortions introduced by the splitting optics from each image produced by it.

Claim 22 is similarly directed to a method of correcting measurement phase data obtained from a multi-channel interferometric imaging system. The referenced Millerd patent teaches an image splitting system for measuring parameters of interest in an incoming beam. The wavefront is split into a plurality of sub-images and static phase shifts or relative path delays are introduced into each sub-image with discrete components to yield a plurality of phase-shifted interferograms. The patent does not teach changing the relative delay between the reference and test beams temporally in order to average out systematic errors in the measurement system.

Claim 22, as filed, recites "(a) producing a set of sub-images, each sub-image in said set corresponding to a channel of the system"; "(b) calculating a phase map from said set of sub-images"; "(c) repeating steps (a) and (b) a plurality of times, each time introducing a phase offset in said set of sub-images, thereby producing a plurality of additional phase maps"; and "(d) averaging said phase map and said additional plurality of phase maps to produce a corrected phase map." Steps (c) and (d) are clearly not disclosed in the Millerd patent. Therefore, this reference is not believed to anticipate the claim.

In view of the foregoing, independent Claims 1, 12 and 22 are not believed to be anticipated by the Feinleb and Millerd references. Therefore, reconsideration of all rejected claims is respectfully requested.

The Examiner indicated that Claims 5, 6, 15, 16 and 23 recite allowable subject matter. In view of the arguments presented above for the allowability of the independent claims, the applicants wish to defer amendment of these claims, if necessary, until after reconsideration of the rejection.

The applicants and their attorney thank the Examiner for her thorough examination and citation of relevant prior art.

No additional fee is believed to be due. Please charge any other amount deemed to be due with this response to our Deposit Account No. 04-1935.

Respectfully submitted,



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